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Amphiphilic dendrons as gene nanocarriers: study of cellular uptake

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Amphiphilic dendrons are copolymer nanoparticles that consist of a hydrophobic focal group, a branched skeleton and numerous charged terminal groups. Due to their ability to bind various compounds, these dendrons have the potential to become effective nanocarriers in targeted drug delivery, in particular, gene delivery.

It has been shown that phosphorous dendrons of the first generation with maleimide focal groups and pyrrolidine terminal groups are the safest and most biocompatible [1, 2], and were therefore selected for further research. Several cell lines were chosen for this experiment, both cancer and normal. The cancer cell lines were HeLa (cervical cancer), Hep G2 (hepatocellular carcinoma), HT-29 (colorectal adenocarcinoma), RD (rhabdomyosarcoma), A-172 (glioblastoma), CEM-SS (T-cell acute lymphoblastic leukemia), HL-60 (promyelocytic leukemia). To compare with normal cells, the HEK 293T cell line (human embryonic kidney epithelium), rat fibroblasts, and human peripheral blood mononuclear cells were used. FITC-conjugated siRNA was encapsulated by the selected amphiphilic dendrons, and the resulting complexes were delivered into above mentioned cells and then measured by flow cytometry. It has been shown that in normal cells cellular uptake didn't exceed 10%, while for cancer cell lines it was significantly higher: from 15% in RD to 70% in HT-29 cells.

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